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# Journal of the Society of Arts.

FRIDAY, SEPTEMBER 2, 1859.

## EXAMINATIONS AND GOVERNMENT APPOINTMENTS.

Two nominations to compete for Government Appointments having been recently placed at the disposal of the Council of the Society of Arts by Lord Palmerston, the candidates nominated by the Council were Mr. George William Wicker, of the Watt Institute, Portsea, who distinguished himself at the Society's Examinations last year; and Mr. John Palethorp, of the Mechanics' Institution, Glasgow, one of the prizemen in the Examinations held in May last.

The Council have much pleasure in announcing that both these candidates have been successful, having obtained the third and fifth places respectively.

There were on this occasion five vacancies and fifteen competitors.

## EXAMINATION PAPERS, 1859.

(Continued from page 648.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

### PHYSICAL AND DESCRIPTIVE GEOGRAPHY.

THREE HOURS ALLOWED.

*The Candidate is only allowed to answer one Half of the Total Number of Questions in each Section.*

#### I. PHYSICAL GEOGRAPHY.

(1.) Give a brief account of either one of the following mountain-systems, making a sketch to show its general direction, and the places of its principal summits:—

- (a.) The Alps.
- (b.) „ Himalaya.
- (c.) „ Andes.

(2.) Classify the rivers of either the Asiatic or North American continents, with reference to the seas into which they flow.

(3.) A broad belt of desert stretches through the Old World, in the general direction of east and west. Distinguish its different portions by name, as they follow in geographical succession.

(4.) Extensive tracts of country are known respectively as steppes, prairies, savannahs, pampas, and karroos. Where are these, and what are their distinctive features?

(5.) What are coral islands? Describe their peculiarities of origin and appearance? In what localities are they chiefly found?

(6.) Either write a brief account of the physical geography of one of the following countries, or draw a map in illustration of it:—

- (a.) Holland.
- (b.) Switzerland.
- (c.) Canada.

(7.) Which are (at the present time) the principal gold-producing regions of the globe? How are they most readily accessible from Britain?

(8.) Among food plants, what parts of the globe are the native seats of the following:—Maize, rice, the date-palm, cocoa-nut-palm, banana, cassava, sago, yam, arrow-root, and bread-fruit?

(9.) What peculiarities (in reference to the organic as well as the inorganic kingdom) distinguish the physical geography of Australia?

(10.) Draw up a list of the coal-fields of England and Wales. Mention the principal towns that are within the limits of each.

(11.) Besides latitude, what other circumstances affect climate? Give some examples of their operation, derived from particular localities.

(12.) What are glaciers? Give a brief account of the commonly-received theory (that of Professor Forbes) with regard to them.

#### II. DESCRIPTIVE GEOGRAPHY.

(1.) Name the capital city of each of the following countries, with the river on which it stands:—Sardinia, Belgium, Portugal, China, Egypt, New Brunswick, Pennsylvania, Switzerland, Tuscany, Bohemia, the Punjab, and Burmah.

(2.) Where are the following places:—Chicago, Caracas, Valparaíso, Mobile, Ancona, Taganrog, Saloniki, Beyrout, Jiddah, Kurachee, Rangoon, Herat, and Callao?

(3.) What alternatives of route are offered in the journey from Great Britain to Australia? Name, in geographical succession, the seas, &c., passed through in the case of either.

(4.) What objects of special interest are found within the valley of the Nile, in its course through Egypt? Suppose a person ascending that river, from the Delta to the first cataract, name such objects (of the description referred to) as would successively meet his notice.

(5.) Give some account of either one of the following British Possessions—as to date of acquisition, climate, inhabitants, and industrial resources:

- (a.) Mauritius.
- (b.) Hong-Kong.
- (c.) South Australia.

(6.) Where is British Columbia, and how may it be reached from England? State briefly the substance of what is at present known concerning its natural features and commercial resources.

(7.) Make a sketch, showing, in the case of either one of the under-mentioned rivers, the direction of its stream, its chief tributaries, and the principal towns comprehended within its basin:—

- (a.) The Thames.
- (b.) „ Humber (Ouse and Trent).
- (c.) „ Shannon.

(8.) Among celebrated battle-fields, where are the following:—Marengo, Austerlitz, Blenheim, Borodino, Hohenlinden, Talavera, Inkerman, Pultowa, Plassey, Flodden, Towton, and Culloden? Give the situation by reference to some well-known locality, whether town, river, or otherwise.

(9.) Draw up as complete a list as you can of the States comprehended within the Germanic Confederation, naming the capital of each.

(10.) Enumerate the political divisions of South America, giving the capital and chief seaport of each.

(11.) Draw a map of the county in which you reside, marking on it the chief natural features (high or low ground, rivers, &c.), and the places of the principal towns.

(12.) What is meant by the north-west passage? What object was proposed it its accomplishment?

#### ENGLISH HISTORY.

THREE HOURS ALLOWED.

*You are to answer the whole, or as many as you can, of the eight following questions:—*

(1.) Explain the following terms :—

Thane.  
Frankpledge.  
Homage.  
Tallage.  
Lord Paramount.  
Villein Regardant.

(2.) Between whom, and in what reign, was each of the following battles fought :—

Assaye.  
Bannockburn.  
Brunanburgh.  
Bunker's Hill.  
Camperdown.  
Lewes.  
Minden.  
Salamanca.  
Zutphen.

(3.) What English kings, or sons of English kings, took part in the Crusades? Mention briefly the chief events of each Crusade, in which an English king or an English prince was engaged.

(4.) Give a brief account of the chief voyages and discoveries of—

Cabot.  
Cooke.  
Drake.  
Hawkins.  
Raleigh.  
Willoughby.

State in what reign each voyage was made.

(5.) What instances of parliamentary impeachment were there before the end of the reign of Richard II? Point out the differences between an impeachment and a bill of attainder.

(6.) What English sovereigns, since the Conquest, died by violent deaths. State where and how each of them died.

(7.) When were the English Boroughs first represented in Parliament? When were the Burgesses formed into one house with the Knights of the Shires? By whom were the Knights of the Shires originally elected? What changes as to the right of voting for Knights of the Shires were made in the reign of Henry VI.

(8.) What were the principal constitutional checks on the Royal Power at the time of the accession of the first sovereign of the House of Tudor.

*You are to answer four, or as nearly four as you can, of the following six questions.*

*You are to select those which you think yourself best able to answer fully.*

*No marks will be obtained by answering more than four.*

(1.) In what respects did Feudalism, as established by the Normans in England, differ from Feudalism as generally established in Continental Europe?

(2.) Give a brief account of the disputes between Thomas à Becket and Henry II. Give also a brief account of the Statutes of Provisors, and of the Statutes of Mortmain. Mention in what reign, and under what circumstances, each statute, which you refer to, was passed.

(3.) What was provided in the Great Charter of John as to the summoning of the Great Council, and as to the pecuniary grants to the King? What variances are there as regards these matters between the preliminary "Articuli Chartarum" and the Charter itself? What variances, also are there in these respects between the Great Charter of John, and the Great Charter as regranted in the reign of Henry III.? What has been provided as regards the right of taxation by the statutes entitled Confirmatio Cartarum and the Petition of Right?

(4.) Give an account of the Statutes of Labourers and of the Statutes as to Vagrants, that were passed in the reign of Edward III. and Richard II., and add a brief sketch of

English Legislation as to the poor, between the time of the Reformation and the end of the reign of Elizabeth.

(5.) Give a brief account of the following treaties, and mention the sovereigns and statesmen by whom each was effected :—

The Treaty of Bretigny.  
The Treaty of Troyes.  
The Treaty of Cateau Cambresis.  
The Treaty of the Triple Alliance.  
The Treaty of Ryswick.  
The Spanish Partition Treaties.  
The Peace of Amiens.

Point out how any of these treaties illustrate the doctrines of international law respecting the balance of power.

(6.) Give a brief account of the state of the English power in Ireland at each of the following epochs :—

At the end of the reign of Henry II.  
At the end of the reign of Edward II.  
At the end of the reign of Henry VII.  
At the end of the reign of Elizabeth.  
At the end of the Protectorate of Cromwell.

What were the chief causes that facilitated the first successes of the English in Ireland, and what chiefly retarded the complete conquest of that island? Give an account of Poyning's law in Henry VII.'s reign. When were its provisions altered or repealed?

## ENGLISH LITERATURE.

THREE HOURS ALLOWED FOR THE TWO AUTHORS SELECTED BY THE CANDIDATE.

CHAUCER.

(Prologue to the Canterbury Tales.)

### SECTION I.

(1.) Turn into modern English the following passage :—

"With us ther was a Doctour of Phisike,  
In all this world ne was ther none him like  
To speake of phisike, and of surgerie :  
For he was grounded in astronomie.  
He kept his patient a ful gret del  
In hours by his magike naturel.  
Wel coude he fortunen the ascendent  
Of his images for his patient.  
He knew the cause of every maladie,  
Were it of cold, or hote, or moist, or drie,  
And wher engendred, and of what humour,  
He was a veray parfite practisour.  
The cause yknowe, and of his harm the rote,  
Anon he gave to the sike man his bote.  
Ful redy hadde he his apothecaries  
To send him dragges, and his lettuaries,  
For eche of hem made other for to winne :  
Hir friendship n'as not newe to beginne."

(2.) Mark the feet in the above passage.—What are the chief peculiarities in the pronunciation of the English of Chaucer's time, which it is necessary to observe in order to bring his verse within the laws of metre?

(3.) Explain the obsolete words and constructions.

(4.) What light does this passage, with its context, throw on the state of medical practice in the age in which it was written?

### SECTION II.

(1.) Explain one of the following passages :—

"And he hadde be sometime in chevachie,  
In Flandres, in Aitois, and in Picardie,  
And borne him well, as of so litel space,  
In hope to stonden in his ladies grace."

"Ful freshe and newe hir gere ypyked was.  
Hir knives were ychaped not with brass,  
But all with silver wrought ful clene and wel,  
Hir girdeles and hir pouches every del."

(2.) Explain the following words and phrases:—sote, swiche, lazar, tretis, fetise, herberwe erulle, vernicle, pilwebere—by culpons on and on—all pemelee grey and highte Scot—surcote of perse.

(3.) Give a brief notice of three of the ecclesiastical persons mentioned in the Prologue.

(4.) Give a sketch of Chaucer's life, with a list of his works.

#### SHAKSPERE.

Macbeth ; Richard II. ; The Tempest.

#### SECTION I.

(1.) Explain the following passages, notice any peculiarities in the words or grammatical constructions, give any various readings with which you are acquainted, and state the connexion in which each passage occurs:—

(a.) " In the devotion of a subject's love,  
Tendering the precious safety of my prince,  
And free from other misbegotten hate.  
Come I appellat to this princely presence."

(b.) " But you, O you,  
So perfect and so peerless, are created  
Of every creature's best."

(c.) " What man dare, I dare ;  
Approach thou like the rugged Russian bear,  
The armed rhinoceros, or the Hyrcan tiger,  
Take any shape but that, and my firm nerves  
Shall never tremble : or be alive again,  
And dare me to the desert with thy sword ;  
If trembling I inhabit then, protest me  
The baby of a girl."

(d.) " Desolate, desolate, will I hence, and die ;  
The last leave of thee takes my weeping eye."

(e.) " This was well done, my bird ;  
Thy shape invisible retain thou still :  
The trumpery in my house, go, bring it hither,  
For stale to catch these thieves."

(f.) " Let your highness  
Command upon me ; to the which, my duties  
Are with a most indissoluble tie  
For ever knit."

(2.) Give the sense of one of the following passages in simple prose, and state in what connexion it occurs.

(a) " The night has been unruly : where we lay,  
Our chimneys were blown down : and as they say,  
Lamentings heard i' the air ; strange screams of death ;  
And, prophesying with accents terrible  
Of dire combustion and confused events,  
New hatched to the woful time,  
The obscure bird clamoured the live-long night :  
Some say the earth was feverous and did shake."

(b) " ———learn good soul  
To think our former state a happy dream ;  
From which awaked, the truth of what we are  
Shows us but this : I am sworn brother, sweet,  
To grim necessity ; and he and I  
Will keep a league till death."

(c) " Thee, of thy son, Alonso,  
They have bereft ; and do pronounce, by me,  
Ling'ring perdition (worse than any death  
Can be at once) shall step by step attend  
You, and your ways ; whose wraths to guard you from  
(Which here, in this most desolate isle, else falls  
Upon your heads) is nothing, but heart's sorrow  
And a clear life ensuing."

#### SECTION II.

(1.) Give some account of the sources from which Shakspeare took the plots of Macbeth and Richard II.

(2.) What are the chief particulars in which Shakspeare has deviated from historical authority in Richard II ?

(3.) Compare the character of Macbeth with that of Lady Macbeth, and illustrate your comparison by references and quotations.

(4.) Sketch the character of Bolingbroke as represented by Shakspeare, and compare it with that of Richard.

(5.) At what dates were Richard II., Macbeth, and the Tempest probably written ?

(6.) What do you know of the state of the text of Shakspeare's plays ? Give any remarkable examples of various readings.

#### BACON.

(Essays.)

#### SECTION I.

(1.) How does Bacon prove and illustrate the following propositions:—

" It is true that a little philosophy inclineth man's mind to atheism ; but depth in philosophy bringeth men's minds about to religion."

" Men's thoughts are much according to their inclination ; their discourse and speeches according to their learning and infused opinions ; but their deeds are after as they have been accustomed."

(2.) Explain the following passages:—

" Divide, with reason, between self-love and society."

" The part of Epimetheus might well become Prometheus in the case of discontentments."

" A man cannot tell whether Apelles or Albert Durer were the more trifler."

(3.) Give the substance in brief of the essay " Of Friendship," or of that " Of the true greatness of Kingdoms and Estates."

(4.) Distinguish between simulation and dissimulation. Under what conditions does Bacon justify them ? How far is his line of argument consistent with true morality ?

(5.) Explain Bacon's use of the following words:—

Munite, tracts, galliard, poller, herselike, beholding, misanthropi, stirp, motion, consort, advoutress, appose, bravery, gaudery.

(6.) State the date of the first publication of Lord Bacon's essays, and give some account of the earliest editions of the work.

#### ADDISON.

(Contributions to the Spectator.)

#### SECTION I.

(1.) Explain the meaning of the following passages, and state the connexion in which each of them occurs:—

" I am a Dane, Swede, or Frenchman at different times ; or rather fancy myself like the old philosopher, who, upon being asked what countryman he was, replied, that he was a citizen of the world."

" Sir Paul Rycant gives us an account of several well-disposed Mahometans that purchase the freedom of any little bird they see confined in a cage, and think they merit as much by it as we should do here by ransoming any of our countrymen from their captivity at Algiers."

" I am sorry to find that an author, who is very justly esteemed among the best judges, has admitted some strokes of this nature into a very fine poem, I mean " The Art of Criticism," which was published some months since, and is a masterpiece in its kind."

(2.) Give a short account of the first Vision of Mirzah.

(3.) Analyse briefly the essay on the Pleasures of the Imagination, or the essay on Cheerfulness.

(4.) What were the names and characters of the chief members of the Spectator's Club ?

(5.) In what respect are the following expressions antiquated ? Can you give other instances of the same kind from Addison's writings ?

" Our conferences go no further than a bow or a grimace."

" Nothing is so modish as an agreeable negligence."

" Cheerfulness in an ill man deserves another name."

## SECTION II.

- (1.) Write a short narrative of the origin, progress, and termination of the publication of the *Spectator*.
- (2.) Give some account of Addison's coadjutors in the work.
- (3.) What are the characteristic merits of Addison's papers, as compared with those of his assistants?
- (4.) Name the best known works of Addison, prose and poetical, distinguishing the most important of them.

GOLDSMITH.  
(Poetical Works.)  
SECTION I.

- (1.) Explain the following passages, and state the connexions in which they occur:—

"Here lies our good Edmund, whose genius was such,  
We scarcely can praise it, or blame it too much."

"Ill fares the land, to hastening ills a prey,  
Where wealth accumulates, and men decay."

- "How did Grub-street re-echo the shouts that you raised.  
While he was be-Rosciused and you were bepraised."

"With food as well the peasant is supplied,  
On Idra's cliffs as Arno's shelvy side."

"The Terence of England, the mender of hearts."

"The lifted axe, the agonizing wheel,  
Luke's iron crown, and Damiens' bed of steel,  
To men remote from power but rarely known,  
Leave reason, faith, and conscience, all our own."

- (2.) Express the sense of the following passage in simple prose and give its context:—

"O blest retirement, friend to life's decline,  
Retreats from care, that never must be mine,  
How blest is he who crowns, in shades like these,  
A youth of labour with an age of ease;  
Who quits a world where strong temptations try,  
And, since 'tis hard to combat, learns to fly!  
For him no wretches, born to work and weep,  
Explore the mine, or tempt the dangerous deep;  
Nor surly porter stands in guilty state,  
To spurn imploring famine from the gate."

- (3.) Explain the allusions in the following passage, and state the connexion in which it occurs:—

—"not far removed the date  
When commerce proudly flourished through the state;  
At her command the palace learned to rise;  
Again the long-fallen column sought the skies;  
The canvas glowed, beyond e'en nature warm;  
The pregnant quarry teemed with human form:  
Till, more unsteady than the southern gale,  
Commerce on other shores displayed her sail;  
While nought remained of all that riches gave,  
But towns unmanned, and lords without a slave;  
And late the nation found, with fruitless skill,  
Its former strength was but plethoric ill."

## SECTION II.

- (1.) What work appears to have suggested to Goldsmith the idea of the *Traveller*? If you can, give some account of it, and compare it with the *Traveller*.

- (2.) What personal allusions are there in the *Traveller*? To whom is it dedicated?

- (3.) Give the substance of the dedication to the *Deserted Village*. What personal allusion is the poem supposed to contain? State its main argument, and express your opinion as to its correctness. Compare this argument with the passage on Britain in the *Traveller*.

- (4.) Sketch very briefly the life of Goldsmith. Who were his best known personal friends? Give a list of his principal prose works and his plays, distinguishing those which have most merit.

(To be continued.)

## UNIFORM MUSICAL PITCH.

The following is extracted from the *Athenæum*:—

A timely piece of reading is to be found in a book by M. Adrien de La Fage (Dentu), on "Tonic Unity and the Establishment of a Universal Diapason,"—being the substance of some letters which appeared in the *Gazette Musicale* in 1856; here republished, with additions and appendical notes. Timely, however, is not synonymous with well-tempered. M. de La Fage takes that side of the question towards which we lean,—namely, that the attempt at uniformity is less called for than has been stated;—further, that, if fixity be ever so stoutly agreed on, by a Government adopting a report, collected on evidence, attracted by theory—to enforce such fixity is simply impossible. Such are the views which have been suggested again and again in the *Athenæum*,—but they are made somewhat suspicious, on being put forth by M. de La Fage, by the sore and aggressive tone of his glosses and intimations.

Let us, however, group together one or two remarks of interest with one or two comments. These may help to show that dissentients may dissent from conviction, not fractious perversity. It may be remembered that, on reading that report of the French Commissioners, which led to the measures adopted by French autocracy, we questioned, not the sincerity of the collectors, but the validity of the evidence. It appears that others, more scientifically competent to speak, have shared our question on the subject. Stress, it may be recollected, was laid in the report on the comfortable pitch of the Carlsruhe A,—a quarter of a tone below that of the Opera at Paris. On this, M. de La Fage remarks,—being corroborated in his caution by M. Aristide Cavaillé-Coll, the great French organ-builder (no bad authority):—

"It is very possible that the tuning-fork sent, from Carlsruhe, to the Commission, may not have been precisely that of the orchestras of the town. In fact, at the last festival at Baden, directed by M. Berlioz, the Carlsruhe musicians, without the slightest difficulty, tuned their instruments with those from other towns, where the diapason was as high as, or higher than that of Paris; so that there could not have been a quarter of a tone difference. It is not then, impossible but that the fork sent was simply the *Kapellmeister's* own."

Something of the kind had already struck us as probable, from remembering the caprices and accommodations elsewhere, which have no authority in deciding the question. In 1839-40, the visitor who went to Dresden to hear the church music of the Saxon capital was warned beforehand that in the Catholic Church, of which, if we mistake not, Morlacchi was then chapel-master—and where were a Silbermann organ with some choice Italian stringed instruments—he would hear a diapason nearly half a tone flatter than it was anywhere else—and why?—to accommodate the voices of certain Italian artificial *soprani*—relics of an elder world—who at that time belonged to the choir of the Catholic Church.—One or two other extracts from the comments of M. Cavaillé-Coll, as discussed by M. de La Fage, are worth quoting:—

"He," says our author, "disapproves of the use proposed by M. Berlioz of an organ pipe, as regulating the orchestral pitch of theatres; since nothing is more variable than the tone of an organ-pipe, owing to the change of temperature."

No want of knowledge on the part of M. Berlioz concerning organs will surprise those who are familiar with his writings on instrumentation; but the fact must be pointed out, as indicating the slack and random way in which a subject of such great delicacy as this can be treated by its jurors. A remark or two more are worth having:—

"We conceive," writes M. Cavaillé-Coll, in 'L'Ami de la Religion,' that the real cause of rise of pitch—of which no one will accept the responsibility—is artistic progress, and not the ignorance or caprice of such or such other maker, composer, or instrumentalist. The progress which is accomplished equally in all civilised countries, and the march of which nothing can stop, is here manifested as in science and mechanical art. We habituate ourselves insensibly to the ameliorations which it produces;

but, if we look back, we see then the distance which we have passed over."

This is the one practical view of the question. Sump-tuary laws (to illustrate by a parallel) do not belong to our time. *Delia* will spend on her back what *Jemima* puts on her table. One conductor will have his brilliant fancy; another, who has been used to "potter an immensity" (as Mrs. Fanny Kemble phrased it) over a flat old organ, will indulge his sleepy notions. One railway company will carry its express at the rate of forty miles an hour; another (as in Belgium) will complacently manage fifteen, and perhaps complain of going too fast. As practically could a normal yellow, red, or blue be imposed on an Academy of Painters to check a Turner *redivivus* in the sun-glare he flings about his "Rock Limpet," or an Allston, when he is trying at a "Uriel" in the sun. Then, too, as a correspondent suggested to the Society of Arts, the taste of the time for brilliancy has been fed and fostered by modern composers, at the instance of those very singers, who, when they become effete, or have not learnt to sing, are the first to complain of it. It was said to us, the other day, by a master as shrewd as distinguished,—"If you write a song now-a-days, the first change which the singer wishes is his favourite high note put somewhere." Every *mezzo-soprano* now-a-days will finish her air on the tone an octave above its original close with a penultimate shake. Signor Tamberlik stings his gratuitous c sharp into the "Otello" duett, to add effect to Signor Rossini's final phrase;—Madame Miolan Carvalho ends her Shadow Waltz in "Le Pardon" on a flat in *all*, in place of *b* on the line. All who *can*, will get up. The waters are out; there is no calling them back. Here, again, is a morsel of evidence, by M. de La Fage, worth weighing:—

"I do not approve," says he, commenting on the passage just paraphrased, "all the developments which M. Cavallé-Coll has given to his idea; but, like himself, I consider that during the past half-century orchestras have doubled in intensity; that consequently, with the *letting-down* principle, which would take us fifty years back, it would be necessary for the Commission simultaneously to propose the exclusion of those brass instruments which were not employed at that epoch, and which, were the old pitch adopted, could not be properly played now-a-days."

Last of all, comes yet one difficulty more—a difficulty, obviously, of great weight, and not small delicacy:—

"The verification of tuning forks" [*vide Athen.* No. 1653, p. 25] "brings out many questions. Two or three of these are obvious. \* \* What would happen if a skilled verifier,—such, for instance, as was M. Cagniard Latour,—were to examine a fork, officially accredited by M. Lissajous, and were the vibrations not to be exactly accredited? What if M. Lissajous himself, verifying, at some interval of time, the same fork, found different vibrations at different intervals? Better than myself, he knows that such things may happen."

So, too, does Mr. Hullah; whose evidence given—given, too, anxiously, on the side of uniformity, at the meeting of the Society of Arts—was the testimony of a man more anxious for truth than for the St. Martin's Hall *La*. His two identical forks, when exposed to different temperatures, he assured the meeting, became different in vibration. What was more, when fork *a* and fork *b* were cooled to the same coldness, the *ex-hot* fork did not recover its old and cold composure.—The immutability of metallic vibration may be a new question; but we have not found that it has been sufficiently established by the scientific gentlemen who have in this case undertaken a subject the importance of which is far greater to Art than to Science.

#### DEODORIZATION OF SEWAGE.

The following report has been addressed by Dr. Hofmann, F.R.S., and Dr. Frankland, F.R.S., to the Metropolitan Board of Works:—

Having been requested by a resolution of your Board, bearing date the 27th day of May, 1859, to undertake

the duty of advising the Board as to the selection, from the various schemes proposed for the deodorization of sewage, of a process combining both efficiency and economy, we now beg leave to report to you the result of a minute inquiry into this subject.

In conducting our investigation, we have carefully kept in view the final plan of dealing with the sewage adopted by the Board, the principal features of which were lucidly described to us in a letter from your chief engineer.

Not the least arduous part of our labours consisted in the careful examination of the numerous, and in many cases ponderous, documents addressed to the Board on this subject, and transmitted to us for consideration. Short abstracts of these proposals will be found in the Appendix.

This examination led us to the conclusion that a comparatively very small number only of these proposals admit of application in conformity with the plan of dealing with the sewage finally adopted by the Board.

The comparatively small number admitting of such application, experienced a further limitation when the several processes were submitted to experimental trial. In fact, of all the proposals, old and new, referred to us, there is only one which appears to satisfy in the necessary degree the conditions involved in the circumstances of the case.

The agent to which we allude is that described as "Dales' Muriate of Iron," essentially a concentrated solution of perchloride of iron, the disinfectant properties of which were some years ago pointed out by Mr. Ellerman. This we have submitted to an extensive series of comparative trials with the well-known disinfectants, lime and chloride of lime, which, probably owing to their long-established character, are not included in the proposals before us.

These trials lead to the conclusion that the deodorization of sewage may be effected either by the perchloride of iron, chloride of lime, or lime; but that, if quantities of equal value\* be applied, the perchloride of iron is markedly superior to either of the others, whilst chloride of lime acts much more powerfully than lime.

These statements refer both to the immediate action of the three agents upon sewage, and to the permanency of the effect produced; but when examined from the latter point of view, the superiority of the perchloride of iron is exhibited even in a still more marked degree.

It may be stated that these results were obtained by operating upon sewage, such as flows from the mouths of the chief metropolitan sewers during the hottest season of the year, our experiments having been performed during the latter half of the month of July.

Since the calculations as to the cost of deodorization are based upon these experiments, it may not be out of place here to mention briefly the mode in which they were conducted. In order to enable us to operate upon a sufficiently large scale, brickwork tanks, lined with cement, and holding 7,500 gallons each, were constructed at the outfall of the King's Scholars' Pond Sewer. The sewage was lifted into these tanks by means of a steam pump, and the various deodorizing agents were incorporated, either by their gradual introduction into the

\* We have endeavoured to arrive at the average prices of these three agents. It appears that they are subject to considerable fluctuation. As the average result of our inquiries, we have taken the value of lime at 9s. per cubic yard = 18 bushels; the value of chloride of lime of 36 per cent. (about the strength of that used in our experiments), at £12 per ton; and that of the perchloride of iron solution, specific gravity 1.45, at 6d. per gallon. Probably these prices would be subject to a certain amount of reduction if very large quantities were consumed. We should state further, that the estimation of the value of perchloride of iron is founded upon our knowledge of the price of its ingredients and the cost of manufacture, although Messrs. Ellerman and Dales, who have proposed this liquid, quote 1s. 6d. as their maximum price per gallon.

shoots during the process of filling, or by diffusing them through the mass of the liquid by means of mechanical agitation.

From a number of experiments thus conducted, it appears that each of the three agents above mentioned will effect the immediate deodorization of 7,500 gallons of sewage when applied in the following proportions:—

Perchloride of iron.....	$\frac{1}{2}$ gallon.
Chloride of lime.....	3 lbs.
Lime.....	1 bushel.

From these results it follows that 1,000,000 gallons of sewage require respectively—

	£	s.	d.
66 gallons of perchloride of iron, costing	1	13	3
400 lbs. of chloride of lime .....	2	2	10 $\frac{1}{2}$
132 $\frac{1}{2}$ bushels of lime.....	3	6	6

During the performance of these experiments, which, as already stated, were made during the hottest portion of a dry season, we were surprised to find that the liquid flowing from the outfall of the sewer was by no means strongly offensive; it was only after preservation in tanks for twenty-four hours, or upwards, that a really powerful odour manifested itself. This circumstance rendered it of the highest importance to inquire more closely into the degree of permanency of the effect produced by the several agents under consideration.

For this purpose, three equal quantities of sewage were collected, and perfectly deodorized respectively by perchloride of iron, chloride of lime, and lime: they were then allowed to stand. After two days, the sewage disinfected by lime became slightly tainted, whilst that deodorized by chloride of lime and perchloride of iron remained perfectly odourless. At the end of three days, the limed sewage had become decidedly offensive, whilst the other two specimens still remained free from smell. After four days, the odour of the limed sewage had become worse, but that treated with chloride of lime likewise began to exhibit an offensive character, whilst the sewage to which perchloride of iron had been added remained perfectly inodorous. Even after the lapse of nine days, the condition of the latter had not changed. In other experiments the same relative permanency of effect has been observed.

Another important element in estimating the comparative fitness of an agent for the treatment of sewage, is, the time required for clarification after the addition of the disinfectant. In this respect, also, the results of the preceding experiments lead us to give a decided preference to perchloride of iron.

It now remains to apply the results thus obtained to the circumstances of the case before us. From the statements in Mr. Bazalgette's letter, it appears that it is at present contemplated to collect the larger proportion of sewage in two reservoirs, to be constructed respectively at Barking Creek and Crossness Point, in which it would be allowed to settle for about nine hours and a half, in order to be discharged into the river during the first two hours and a half of the ebb tide. The third portion of sewage, we learn from Mr. Bazalgette's letter, will be pumped into the river all the year round at a point near Cremorne Gardens, termed the outfall for the Western Division. The subjoined table gives the quantities of sewage discharged at present daily, according to Mr. Bazalgette's estimate, and likewise the quantities anticipated in future years.

	Present.	Prospective.
Discharge of Sewage at Barking Creek	56,536,875	62,500,000
Do. Crossness Point .....	20,066,250	35,937,500
Do. The outfall of Western Division .....	4,646,875	9,375,000
Total .....	81,250,000	107,812,500

The sewage discharged at Barking Creek and Cross-

ness Point would probably not require deodorization, except during the hot season of the year—say during three months. Supposing the deodorization to be effected by perchloride of iron, the disinfection of this portion of the sewage at the present rate of flow would involve an expenditure of £11,620 13s. 9d. for the three months. We are, however, of opinion that in practice the sewage discharged into the river at this distance from the metropolis would rarely require deodorization for so long a period as three months. In fact, we are not without hope that the sewage, supposing it to arrive at these outfalls in a condition similar to that in which it is at present discharged from the King's Scholars' Pond Sewer, would, when properly freed from suspended matter, only require deodorization under particularly unfavourable circumstances.

With regard to the sewage discharged at the outfall of the Western Division, it will be indispensable to submit it to a systematic deodorization the whole year round. Owing to the comparatively small fraction of the sewage delivered at this point, a very moderate sum would cover the expense—£2,821 3s. 0d. being the cost of the disinfectant for the year.

Having thus stated the results of our experiments regarding the process of deodorization, it remains only to draw particular attention to the importance of discharging the sewage into the river as free from mechanically-suspended matter as possible. We have found that this suspended matter, when separated even from the deodorized sewage, rapidly passes in warm weather into a state of active putrefaction. The removal of this matter would, in a great measure, prevent the formation of any offensive deposit upon the banks of the Thames, not to speak of the improvement in the appearance of the river which would thus be secured. We are therefore of opinion that filtration should be invariably employed at the outfall of the Western Division, and that subsidence, if not actual filtration, should be resorted to at the two remaining outfalls.

The putrefactive tendency of the deposit separated by filtration or subsidence, renders its rapid removal from the reservoirs or filters a matter of the utmost importance, especially during summer; for the process of putrefaction, when once commenced, can be arrested only by quantities of disinfectants practically impossible.

It is not within our province to enter into details respecting the mechanical arrangements necessary for the application of the disinfectant, or for the filtration and subsidence of the sewage; but we beg to express our opinion, based upon the experience acquired during this investigation, in manipulating with comparatively large quantities, that the disinfection of vast volumes of sewage can be more easily accomplished than is generally believed, and than we ourselves anticipated at the commencement of our inquiry. The actual process of deodorization will probably present less difficulty than the mechanical separation of the deposit by filtration or subsidence. This separation will involve the temporary storage of immense quantities of sewage, the rapid removal of large quantities of deposit, and a number of operations which can be successfully carried out only with considerable system and under strict inspection. Operations of this kind should be as far as possible conducted at a distance from densely populated districts; and we consider it therefore a happy feature of the scheme adopted by the Board, that a small fraction only of the total amount of sewage requires to be manipulated in the immediate neighbourhood of London.

(Signed) A. W. HOFMANN,  
E. FRANKLAND.

London, August, 1859.

#### APPENDIX.

In the body of the report we have alluded to the considerable number of proposals addressed to the Metropolitan Board of Works, and referred by them to us for

examination. In order to divest the report as much as possible of embarrassing detail, we have refrained from entering into a description of each of the several suggestions which have been made. We have, however, thought it desirable to give condensed abstracts of these proposals, in this Appendix.

John T. Barry, Esq., proposes proto-sulphate of iron as a disinfectant for sewage, and also suggests that charcoal might be introduced into the air-spaces of sewers, in order to destroy noxious gases.

G. Lindsey Blyth, Esq., recommends that superphosphate of magnesia should be mixed with the sewage, which should then be precipitated with lime, or another alkaline earth, the object being the production of a manure.

W. Burness, Esq., recommends separate systems of drainage for sewage, and for surface water. The latter he would filter, if necessary, before its discharge into the Thames; the sewage he would pump to the proper level, and pass through suitable pipes for distribution in the surrounding agricultural districts, completing the distribution before the sewage had time to putrify and become offensive. He is of opinion that the value of liquid manure is much greater than that indicated by its constituents, because "during the process of decomposition of animal and vegetable matter, oxygen is worked up both from water and the atmosphere; consequently hydrogen is liberated from the former, and nitrogen from the latter; so that these two uniting, form ammonia, one of the best fertilisers."

Gurney Burt, Esq., states that he will shortly make a proposal for utilizing the London sewage, without deodorization, by distributing it over the country, by means of the railways.

Henry Callen, Esq., recommends the deodorization of sewage by galvanic or electric agency.

John Chisholm, Esq., makes a similar proposal.

Henry Bollman Condry, Esq., calls attention to the manganates and permanganates as powerful agents of deodorization and disinfection.

Henry Cornfoot, Esq., suggests ferruginous sulphate of alumina, commonly called Moll's Patent Reactive, as a deodorizer for sewage.

Daniell Dealey, Esq., chemist, and William Richards, Esq., engineer, propose to generate chlorine from "a mixture of muriatic acid and quick lime," on board a steamer, which is to be "constantly running up and down the river, and discharging the gas on both sides as it goes along."

Richard Dover, Esq., advises to flush the sewers daily "with the antiseptic hydrochloric acid, and liquefied proto-sulphate of iron, and chloride of sodium combined."

C. F. Ellerman, Esq., recalls attention to the use of perchloride of iron, which he proposed some years ago as a disinfectant.

Richard Ely, Esq., intimates that he has a process for the precipitation of sewage in reservoirs, of which no further description was obtained.

Charles F. A. Glassford, Esq., proposes to carry off the rain water in the sewers, and to make such arrangements in the houses as to allow only a limited quantity of water to become mixed with the excreta. This mixture is to be collected in vessels to be daily discharged into reservoirs, where it is to be mixed with sulphuric acid, and allowed to settle. The liquor is to be then evaporated, and the solid matter squeezed through such filter-presses as are used at the Leicester Manure Works.

G. Garbert, Esq., of Mauritius, suggests the abolition of water-closets, and the substitution of boxes containing peat charcoal.

M. Gronvelle proposes to deodorize by means of a pyrito-aluminous lignite, commonly called "cendre noir," which is stated to be extensively used by the scavengers in Paris.

William Goreham, Esq., communicates the following plan:—"To form reservoirs at the mouths of the sewers;

to allow the sewage to settle in these reservoirs; to remove the sediment by trays, and to disinfect and dry the contents of the latter by placing them in chambers through which the products of combustion of a suitable furnace are passing.

John Hitchman, Esq., gives his arguments in favour of

"The rainfall to the river,  
The sewage to the land."

Mr. Howard, British Minister in Lisbon, reports on a contract between the municipality of that town and a company formed for collecting the excreta and converting them into sewage. The company propose to supply each house with a separating apparatus, and with the necessary disinfectant (the nature of which is not stated). The Municipality will compel the inhabitants to use the apparatus, and proposes to furnish the land for the works.

Henry Kemp, Esq., suggests "pyritous peat" for deodorizing sewage. In a second communication Mr. Kemp enters into some details regarding the mode of applying the peat, which he proposes to enclose in wire cages attached to the stems of the river steamers; and he advises the introduction of similar cages into the mouths of the sewers.

Charles F. Kirkman, Esq., offers to exhibit upon a large scale the practicability of a plan which he has successfully employed upon a small scale. He does not state the nature of the plan in his original communication, but in a subsequent letter mentions that his method is not a chemical one.

James Knight, Esq., proposes to establish a number of filter-beds on each side of the mouth of a sewer, and to allow only the clear water from which the solid matter has been deposited, to flow into the Thames.

C. N. Kottula, Esq., proposes to remove the Thames' nuisance by increasing the specific gravity of the river over that of sea-water, "so that the river-water may become heavier than that of the sea; whereby the former, instead of being driven back by the incoming tide, will give way to the flow of the sea-water, and will allow it to flow up, while the river-water will run out, or, at all events, remain under the sea-water." He thinks he can accomplish this object "by dosing into the river at various points common salt."

M. G. M. Legé suggests to attach to the drain of each house a receptacle so constructed as to allow of the separation of the liquids from the solids; the former to be permitted to pass into the sewers, and the latter being removed once in eight or ten days, to be converted into manure.

M. Louis Napoleon Legras states, that he has invented a deodorizer which is applicable to London sewage water, and which produces a valuable manure. The nature of the agent is not stated, and no information could be obtained on application.

A. McDougall, Esq., and Dr. Angus Smith, propose the use of carbolate of lime in solution, and also of a solid mixture of sulphites and carbolates. These substances are to be added to the sewage to produce immediate and permanent deodorization.

F. C. Maguire, Esq., advises to convey the sewage to railway stations, and then to transmit it to the surrounding agricultural districts through earthenware or iron pipes. If necessary and practicable, he would filter it through dry sewers constructed over the present drains, converting the solid matter into manure, and deodorizing the filtered liquid in subterranean deodorizing docks; the deodorized fluid to be then pumped into reservoirs at levels, sufficient to allow of its being conveyed in pipes along the various lines of railway to the provinces. He proposes no method of deodorization.

M. J. Marino, of Copenhagen, communicates a plan for inodorous water-closets.

Dr. Henry Medlock, suggests that sewage would probably be deodorized by means of scrap iron, and subse-



quent filtration through beds of sand and charcoal; but he states that he has not yet had an opportunity of testing the efficacy of this suggestion on a sufficient scale and by a sufficient number of experiments.

M. Moll, *vide* Henry Cornfoot, Esq.

George F. Morrell, Esq., calls attention to the deodorizing properties of chloride of zinc.

The Rev. Henry Moule proposes to separate the sewage from the rainfall; the liquid portion of the former to be evaporated, the solid to be dried and deodorized. The ordinary modes of evaporating are stated to be chimerical, but the plan proposed is rendered perfectly possible "by the discovery in November last of something in the nature of steam which was hitherto unknown."

W. Oldham, Esq., suggests to separate the solid filth from the sewage, and to distribute the liquid over the land in the neighbourhood.

M. Paulet, Fils, recommends the use of a mixture of sulphate of lead and chloride of zinc, and of sulphate of manganese, for the deodorization of sewage.

William Richards, Esq., *vide* Daniell Dealey, Esq.

Dr. T. Angus Smith, *vide* A. McDougall, Esq.

Rudolph Turecki, Esq., states that he has discovered a material which enables him to disinfect excrementitious matters, and to convert them into manure; but he does not state the nature of the materials which he employs.

Mr. Wells is in possession of a method for the treatment of sewage, but states that it is not chemical, and is communicable only by personal interview.

Sir William Worsley suggests the conveyance of the sewage to a cesspool in the Greenwich Marshes, thence to flow into the river at the turn of tide. No method of deodorization is suggested.

A glance at these proposals will show at once how few of them address themselves to the special question submitted to us for inquiry. A final plan of disposing of the sewage having been fixed upon by the Board, our investigation was of necessity limited to a comparison of the efficiency of the several deodorizing agents proposed.

After experiments continued for several weeks, we arrived at the conclusions already stated in our report.

In these experiments we had occasion to observe, that most of the agents proposed possess the disinfecting power which their inventors have pointed out, and many of them in so marked a manner as to render them undoubtedly valuable for a variety of special purposes. Not one of them, however, in our opinion,—with the exception of the agent suggested in the report,—possesses that combination of properties which could warrant us in recommending it to the Metropolitan Board of Works, for the deodorization of the London sewage.

#### THE WESTMINSTER CLOCK.

The following further correspondence has appeared in *The Times* on this subject:—

SIR,—Owing to the irrelevancy of the greater portion of Mr. Denison's letter in *The Times* of yesterday, and the general tone of it, I do not propose to do more in this letter than substantiate the statements contained in my former one. Mr. Denison says, "To his (Sir Charles Barry's) statements that I approved those hands, as ultimately made by him, and that I fixed them, or saw them before they were fixed, or had anything whatever to do with the fixing, I give the flattest contradiction within the compass of the English language."

In reply, I subjoin a copy of a declaration of those who were employed in making and fixing the hands of the clock, under Mr. Denison's control and direction, the original of which was forwarded to the Office of Works on the 14th of July last:—

"We the undersigned, who have been employed in executing the work of the hands of the great clock of the New Palace at Westminster, do hereby declare that we have throughout acted under the directions of Mr. Deni-

son in that work, and that after having submitted to that gentleman two pattern minute hands, exhibiting various modifications for lightening the weight, we succeeded in producing a hand which he said entirely met his wishes. He also said that he did not imagine that they could have been made so light in weight, and desired that the remaining three hands might be proceeded with, in accordance with it in all respects.

"THOMAS QUARM, Clerk of Works.

"JABEZ JAMES, { Engineer and Contractor for the  
Hands, Broadwall.

"HENRY HART, Foreman to Mr. James."

On the subject of weight the following declaration was forwarded to the Office of Works on the same day:—

"We the undersigned, having this day witnessed the weighing of one of the minute hands of the great clock of the New Palace at Westminster, do hereby declare the weight of that hand, and its external appendage, the counterpoise, to be as follows:—

	Cwt.	qrs.	lbs.
Entire weight of hand and counterpoise,	2	1	22
Weight of counterpoise beyond the axis			
of the arbor or spindle (deducted) ...	1	0	25
Net weight of the hand ...	1	0	25

"CHARLES BARRY.

"THOMAS QUARM, Clerk of Works.

"J. JAMES, Engineer and Contractor, Broadwall.

"HENRY HART, Foreman to Mr. James."

If it be true, as Mr. Denison alleges, that Mr. Dent is able to give credit to the Government for 26 cwt. of old gun metal, lead, and iron, out of what he is pleased to term my minute hands, all I can say is that above 16 cwt. of that weight consists of cumbrous additions made to the hands by Mr. Denison himself as internal counterpoises. The excessive weight of such internal counterpoises caused so much torsion in the arbor, which is a piece of gas tubing only, about 9 feet long and 2½ inches in diameter, that the hands could not be made to work, and after repeated trials of them by Mr. Denison himself they were condemned altogether.

Further evidence can be adduced, if necessary, on this subject; but I think I have said enough to enable the public to judge whether Mr. Denison was not concerned in both the preparation and the fixing of the hands, and whether, therefore, he is not as responsible for them as he is for all other going parts of the clock.

Yours faithfully,

CHARLES BARRY.

Old Palace-yard, Aug. 26.

SIR,—I have a short but tolerably decisive answer to give to Sir C. Barry and all his certificates from the people who did the hand business for him.

The hand and tail, or partial external counterpoise, which constitute the whole weight to be moved outside the dial, and of which he got my approval in 1857 (subject to the question of their being found strong enough), weighed 1 cwt. 2 qr. 14 lb., and consisted of gun metal only.

It seems that he did afterwards find them too weak, as I told him I believed he would, in spite of all the assurances of himself and his engineers to the contrary; and then, without letting me know anything about it, he began patching them up with copper at the back of the hand and adding lead to the tail, till they reached nearly 3 cwt., and required 3½ cwt. more of the short counterpoises inside to complete the balance.

The statement that I made the counterpoises would do him no good if it were true, because the weight of the hands, of course, fixed that of the counterpoises, but it is simply false besides.

His figure of 1 cwt. 25 lb. as the weight of the hand without the tail is equally irrelevant, as that is a merely arbitrary division of the external mass into two parts, both of which equally produce the friction to be over-

come by the clock; and, as their lengths are very different, they do not balance each other, though the weight looks the same on paper; and even that is gratuitously wrong also, for he has omitted the lead or something else.

There is now lying at Westminster a cast-iron hand, his first essay in the art, which certainly had the merit of being strong enough; but I at once rejected it, as being at least twice the proper weight. That weighed under 5 cwt., with its complete counterpoise; and yet he has the face to say that I afterwards approved a weaker hand, weighing with its counterpoises 6½ cwt.

He knows also that I always told him the right way was to make the hands as thin tubes, as the new ones are; and that so made the whole weight need not exceed 2 cwt., which is exactly the weight of the new ones completely counterpoised.

The long and short of the matter is that, as usual, he made every blunder that lay open to him, and grossly deceived me into the bargain, by getting my consent to a pattern lighter than the one I had first condemned, and then secretly altering it into one much heavier and in every respect worse.

If he has any more to say I shall not be able to return his fire with the usual velocity, as I am going into the north to-day, having already lost three weeks of the long vacation by staying here to see his blunders put in train for being cured as far as possible.

May I take this opportunity of adding that several musicians of great eminence assure me that the new Big Ben is very superior in tone to the old one, which deviated from the pattern I had given? One of them says he considers it the finest bell in Europe. This, however, is a matter of musical opinion, which I do not feel competent to discuss myself; but after all that has been said to the contrary, by persons not much more competent, it is a fact which ought to be known.

So, with due thanks for the space you have kindly afforded me,

I remain, Sir, yours obediently,

E. B. DENISON.

Aug. 27.

SIR,—I am at a loss to discover in Mr. Denison's letter in *The Times* of this day any "decisive" or even intelligible reply to my statements; but I am glad to find that he no longer denies having ever seen or had anything to do with the minute hands, which he has now condemned as useless. I am content, therefore, to leave the matter as it now stands, and have no wish to intrude further upon your columns in making any remarks upon the gratuitous and unfounded assertions and insinuations as regards myself which are contained in his present and former letters.

I am, Sir, yours faithfully,

CHARLES BARRY.

Old Palace-yard, Aug. 29.

#### WATER-GLASS.

The following communication on this subject has been addressed to the Editor of the *Athenæum*:—

"Upper Holloway, August, 1859.

"The interesting articles that have lately appeared in the *Athenæum* upon water-glass, have afforded what I believe to be the solution of a difficult problem—viz., the formation of 'Beekites' (so called from the late Dr. Beeke, Dean of Bristol, who first drew attention to them), and for which I beg the favour of a small space in your columns.

"As from the very limited distribution of these quasi-fossils many of your readers may not be familiar therewith, I will, by permission, in the first place briefly describe these from my own observations and chemical analyses, referring those who may desire further particulars to a paper by Mr. Pengelly, read at the meeting of the British Association, at Cheltenham, in 1856.

"Rambling last autumn upon the rocks of Livermead Head, in Torbay, I found objects which I at first supposed, from their external character, were fragments of fossil madrepora. Upon closer inspection, however, their difference was obvious. The Beekite is not exactly a fossil, but an incrustation of chalcedony upon a nucleus of coral, and occasionally, but rarely, upon fragments of limestone. The chalcedony is deposited in concentric circles around minute tubercles. These are very sharply defined in the Beekites that are freshly dug out of the cliff above high-water mark,—but if picked up on the beach, or taken from the cliff where tidewashed, they are smoother and have lost much of their peculiar features. In size the Beekite varies very much; I have found many of the size of beans. I have a very beautiful specimen as large as a fist, and another less perfect nine or ten inches in length. Mr. Pengelly has found them of a foot in diameter. Their form is irregular; most commonly they are more or less round. They take their shape from the fragments of coral upon which the chalcedony has been deposited, and which having become more or less decomposed and disintegrated the chalcedony forms a kind of shell or case inclosing its remains. The coral within is found in various stages of decomposition, in some filling the interior, in others nearly so, allowing so much movement that when shaken the contents may be heard to rattle; in others the coral is so completely broken down that only a powder, consisting of the carbonate of lime and some brown particles of organic matter, remain. The interior of the silicious shell has often the markings of the original coral; in the majority of the specimens which I have examined, the interior has been simply irregularly modulated or granulated.

"Having submitted a Beekite weighing 1,040 grains to chemical analysis, I obtained the following results:—Carbonate of lime, 470 grains; chalcedony, 540; peroxide of iron and alumina, derived from the red conglomerate whence it was taken, 5; carbonaceous matter, residue of animal matter of coral, 25 grains.

"A very remarkable feature in the history of Beekites is, that they are not found in the rocks beyond Torbay, and that they are most abundant in limited portions even of that district—*e. g.*, Livermead and Paignton. Mr. Pengelly has searched other beds of conglomerate throughout Devonshire, and has not met with them elsewhere. I searched the cuttings of the new Dartmouth Railway without success. It was stated during the discussion at the British Association, that true Beekites had been found in Australia, on the banks of the Nerbuddah in India, in the north of Scotland, and near Lidcot in Somersetshire. They have been, however, but few in number and very sparsely scattered. That they should be thus scarce and local is certainly a very curious circumstance. The shores and cliffs of Torbay consist of the conglomerate, or ancient beaches, formed from the New Red Sandstone: among the fossils of which corals predominate. Fragments of coral may often be found without the silicious crust of chalcedony. Other fossils, it may be observed, are scarce in the conglomerates of Torbay.

"The problem offered by these objects was, how they could have obtained their silicious crust, lying as they do in a conglomerate of a loose character, free from silicious cement. It is clear that the crust of chalcedony must have been deposited *in situ*, otherwise, the Beekites would present the evidences of water-wear, equally with the pebbles of the conglomerate in which they are found. Doubtless, as Mr. Pengelly suggested, the coral was in a state of decomposition before the deposition of chalcedony commenced. Still it remained a puzzle to account for the presence of silicious matter on these fragments of coral, to the exclusion of the surrounding fragments of rock. The difficulty, it appears to me, is got over by the recent researches upon soluble silicates. In the report of the Commission of the French Academy of Sciences [*Athen.*, No. 1,653], it is suggested that flint-

stones, agates, petrified woods, and other silicious infiltrations owe their formation to a slow decomposition of alkaline silicate by carbonic acid. Mr. Ransome, in a later communication, states that the presence of a chloride renders still more certain and durable the silicification. We have, then, thus placed before us precisely the conditions under which Beekites would be formed. Fragments of coral, broken by the waves and deposited with the beach, now constituting rocks of red conglomerate, would retain a certain proportion of chlorides, while their decomposition would liberate the carbonic acid, which would separate the alkaline constituent of silicious springs, and cause the deposition of silica upon the nucleus of coral. That a similar silicious deposition is not found upon the surrounding deposit is satisfactorily explained by the non-liberation of carbonic acid from the pebbles, into the composition of which its elements did not enter. This view is strengthened by the fact of the non-silicification of the nucleus itself, the silicate being arrested on its surface by the escape of carbonic acid. Furthermore, where chalcedony presenting the Beekite characters has been found upon stone, it has been limestone, from which it is possible carbonic acid may have been disengaged at the time of deposition. The characters of chalcedony, as presented in the Beekites, moreover, approach very closely to those of the silicious incrustations of the Geyser springs in Iceland.

"W. B. KESTIVEN, F.R.C.S."

## PARLIAMENTARY REPORTS.

### SESSIONAL PRINTED PAPERS.

#### PAR. NO.

*Delivered on 6th August, 1859.*

- 140. Norwich Election—Minutes of Evidence.
- 132. Cambridge University (Scholarships of St. John's College)—Copies of Two Statutes.
- 113. Bills—Cottages (Scotland).
- 114. " Corrupt Practices Prevention Act (1854) Continuance.
- 115. " Inclosure Acts Amendment.
- 116. " Stock in Trade Exemption.
- 117. " Ecclesiastical Jurisdiction Continuance.
- 119. " Inclosure.

Revision of Consular Fees—Report on Mr. Murray's Plan.

*Delivered on 8th August, 1859.*

- 130. County Treasurers (Ireland)—Account.
- 153. New Foreign and Indian Offices—Further Return.
- 127. Gloucester Election—Minutes of Evidence.
- 118. Bills—Episcopal and Caputal Estates Act Continuance.
- 120. " Law of Property and Trustees Relief (amended).
- 121. " Charitable Trusts Acts Continuance.
- 122. " European Troops (India).
- 123. " Marriages (Lisbon).
- 124. " Reserve Volunteer Force of Seamen (amended).
- 125. " Stamp Duties (amended).

Hudson's Bay Company's Charter and Licence of Trade—Papers.

*Delivered on 10th August, 1859.*

- 131. Divorce and Matrimonial Causes—Return.
- 142. Letters of Detention—Abstract of Return.
- 154. East India (Debt, &c.)—Return.
- 108. East India—Territorial Accounts.
- 126. Bill—Sale of Gas (amended).

*Delivered on 11th August, 1859.*

- 141. Aylesbury Election—Minutes of Evidence.
- 111. Bills—Tramways (Ireland) (amended).
- 112. " Public Charities.

*Delivered on 12th August, 1859.*

- 151. Treasury Chest—Account.
- 160. Army (Infantry and Cavalry)—Return.
- 161. Army (Foot Guards and Infantry of the Line)—Return.
- 181. The Serpentine—Copy of Mr. Hawksley's Letter.
- 147. Limerick City Election—Minutes of Evidence.
- 127. Bill—Masters and Operatives.
- Births, Deaths, and Marriages (England)—20th Report of the Registrar General.
- Poor Law Board—11th Annual Report.

*Delivered on 13th August, 1859.*

- 133. County Rates (Ireland)—Return.
- 148. Trinity House Pilots (Port of London)—Return.
- 160. Fisheries (Ireland)—Copy of Mr. Stopford's Letter.
- 169. Factories Regulation Acts—Return.

## PATENT LAW AMENDMENT ACT.

### APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

*[From Gazette, August 26th, 1859.]*

*Dated 30th July, 1859.*

- 1768. A. B. Seithen, 6, Alpha-place, Caledonian-road—Imp. in cases or boxes, and in casings, hampers, baskets, and wrappers for holding bottles, jars, and other articles.

*Dated 1st August, 1859.*

- 1778. E. Merrell, Little George-street, Minorities—Imp. in apparatus for washing and cleansing.

*Dated 4th August, 1859.*

- 1800. E. J. Cordner, Derramore, Ireland—Imp. in the application of kites to the saving of life and property from shipwreck, and to other purposes.

*Dated 5th August, 1859.*

- 1808. R. T. Pattison, Daldorch, Ayr, Scotland—Imp. in dyeing certain woven fabrics.

*Dated 8th August, 1859.*

- 1822. J. Cunningham, Paisley—Imp. in and connected with Jacquard apparatus for weaving.

- 1824. R. A. Brooman, 166, Flee'-street—Improved means of preventing incrustations in steam boilers. (A com.)

- 1826. L. B. Ollivier, 29, Boulevard St. Martin, Paris—Imp. in closing or stoppering bottles, jars, and other receptacles.

- 1827. B. Baugh, Birmingham—Certain imp. in the mode and apparatus for partially forming, and finishing the edges of certain description of vessels formed or raised from sheet iron or other metal.

- 1828. J. H. Johnson, 47, Lincoln's-inn-fields—An improved signal light, and in the apparatus employed in the production thereof. (A com.)

- 1830. G. T. Bousfield, Loughborough-park, Brixton—Imp. in revivifying the scarlet colour of woollen cloth, lace, and embroidery, in use for military and other garments and furniture. (A com.)

- 1832. J. B. Babcock, 35, Milk-street, Boston, U.S.—Imp. in umbrellas and parasols. (A com.)

*Dated 9th August, 1859.*

- 1834. N. Kenward, Sutton, Surrey—Imp. in constructing tubular steam boilers.

- 1836. J. Cannon, Billiter-street—Imp. in washing machines. (A com.)

- 1838. C. L. J. Dierickx, Paris—A new system of scales, to be used principally in the fabrication of coins.

- 1844. W. Williamson, High Holborn—An improved machine or tool for drilling holes.

- 1846. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in destroying noxious exhalations. (A com.)

*Dated 10th August, 1859.*

- 1850. T. A. Temperton, Manchester—Imp. in pipes for smoking tobacco.

- 1852. G. Capper, Bidborough-street, New-road, Middlesex—Imp. in the permanent way of railways.

- 1854. J. J. Speed, jun., Detroit, U.S.—Imp. in the manufacture of pipes, tubes, and hollow cylinders.

*Dated 11th August, 1859.*

- 1855. R. Heaton, jun., and G. Heaton, Birmingham—Imp. in coining machinery.

- 1857. J. T. Pitman, 67, Gracechurch-street—A composition applicable to the lubrication of machinery and to various other uses. (A com.)

- 1858. W. Bouch, Shildon, Durham—Imp. in breaks, in buffers, and in couplings to be used on railways.

- 1859. D. Hulett, 55 and 56, High Holborn, and G. Prudden, Sheffield, Beds—Imp. in apparatus for the manufacture and distribution of gas, and in apparatus applicable for internal or external illumination.

- 1860. W. De la Rue, and Dr. H. Muller, 110, Bunhill-row, Middlesex—Imp. in treating Japan and other vegetable wax.

*Dated 12th August, 1859.*

- 1862. W. Clark, 53, Chancery-lane—Certain imp. in oscillating engines. (A com.)

- 1863. A. Evaux, 206, Regent-street—Artificial marbles.

- 1864. W. H. Tooth, 3, Spring-terrace, Wandsworth-road—Imp. in the mode of cleaning or laying the dust of pavements, roads, or other surfaces.

- 1865. J. Philp, Camden-town—An improved hobby-horse or child's exerciser.

*Dated 13th August, 1859.*

- 1867. D. Campbell, 7, Quality-court, Chancery-lane—Imp. in the preparation of oils for medicinal and other purposes.

- 1868. J. Brown, 8, Exeter-place, Walham-green, Middlesex—Improving false shirt fronts.

- 1870. W. Green, Kidderminster, W. Fawcett, and F. R. Fawcett, Wolverley, Worcestershire—Imp. in the manufacture of rugs.

### PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

*[From Gazette, August 26th, 1859.]*

2058. G. Anderson.

*[From Gazette, August 30th, 1859.]*

*August 26th.*

- 2006. B. A. Grautoff and C. H. W. Albrecht.

*2102. C. Brook, jun.*

*August 27th.*

- 2007. T. Watson.

*2023. J. Gregory.*